CLAIMS

1. Method for identifying an incoming peak traffic condition in an elevator system, characterized in that the method comprises the steps of:

monitoring in real-time peak hour identification of the elevator system the number of car calls and the car load of an elevator taking in passengers in a lobby area;

determining a car load threshold value, on the basis of which an elevator is identified as a peak elevator if the car load exceeds the car load threshold value;

defining a threshold value of car calls, on the basis of which a peak elevator is identified if the number of car calls to floors outside a lobby area exceeds the threshold value of car calls;

collecting statistical data regarding the numbers of passengers arriving to a floor in the elevator system and those leaving the floor during predetermined time windows; and

selecting the prevailing traffic type as an incoming peak traffic condition if at least one peak elevator has been detected and the collected statistical data for the current time window indicates an incoming peak traffic condition.

2. Method according to claim 1, characterized in that the method further comprises the step of:

determining the number of simultaneous peak elevators that is required for identification of a real-time peak traffic situation.

3. Method according to claim 2, characterized in that the method further comprises the step of:

selecting the aforesaid number of simultaneous peak elevators to be two.

4. Method according to claim 1, characterized in that the method further comprises the steps of:

determining weighting values for the entrance floors on the basis of the statistical data and in accordance with the number of passengers; and

directing the elevators during an incoming peak traffic situation to the entrance floors according to the weighting values thus determined.

5. Method according to claim 1, characterized in that the method further comprises the steps of:

defining the length of the time window to be used in the statistical data;

calculating the numbers of passengers arriving to and leaving the floor within the defined time window in relation to the time of the day;

adding the statistical data regarding the aforesaid numbers of passengers collected for the diurnal cycle under consideration to the existing statistical data, weighted by a predetermined updating coefficient; and

inferring from the said statistical data the most probable traffic type prevailing during each time window.

6. Method according to claim 2 or 3, characterized in that the method further comprises the steps of:

identifying a potential peak traffic situation if the said statistical data indicates a peak traffic situation; and

interpreting the potential peak traffic situation as an actual peak traffic situation if the number of peak elevators detected during the potential peak traffic situation is at least one but less than the aforesaid simultaneous number of peak elevators.

7. Method according to claim 2 or 3, characterized in that the method further comprises the steps of:

calculating the said time interval between departures of elevators from the entrance floor;

forecasting on the basis of the statistical data the numbers of passengers gathering in the elevator queue during the aforesaid time interval;

identifying a potential peak traffic situation when the aforesaid forecast number of passengers exceeds the car load threshold value for peak hour identification; and

inferring the potential peak traffic situation as an actual peak traffic situation if the number of peak elevators detected during the potential peak traffic situation is at least one but less than the aforesaid simultaneous number of peak elevators.

8. Method according to claim 6 or 7, characterized in that the method further comprises the step of:

requiring at least the said simultaneous number of peak elevators outside a potential peak traffic situation for identification of an actual potential peak traffic situation.

9. Method according to claim 7, characterized in that the method further comprises steps wherein:

weighting coefficients are determined for one or more time windows preceding and following the time window used in the statistical data;

the number of passengers gathering is forecast in the aforesaid manner, in addition to the time window for the moment under consideration, for all the aforesaid time windows by using the weighting coefficients determined;

a potential peak traffic situation is identified if at least one of the said forecast numbers of pas-

sengers exceeds the car load threshold value for peak hour identification; and

the potential peak traffic situation is inferred as an actual peak traffic situation if at least one but fewer than the aforesaid simultaneous number of peak elevators are detected during the potential peak traffic situation.

10. Computer program product for identification of an incoming peak traffic situation in an elevator system, characterized in that the computer program product comprises a program code arranged to execute the steps of:

monitoring in real-time peak hour identification of the elevator system the number of car calls and the car load of an elevator taking in passengers in a lobby area;

determining a car load threshold value, on the basis of which the elevator is identified as a peak elevator if the car load exceeds the car load threshold value;

defining a threshold value of car calls, on the basis of which a peak elevator is identified if the number of car calls to floors outside the lobby area exceeds the threshold value of car calls;

collecting statistical data regarding the numbers of passengers arriving to a floor in the elevator system and those leaving the floor during predetermined time windows; and

selecting the prevailing traffic type as an incoming peak traffic condition if at least one peak elevator has been detected and the collected statistical data for the current time window indicates an incoming peak traffic condition.

11. Computer program product according to claim 10, characterized in that the program code has been further arranged to execute the step of:

determining the number of simultaneous peak elevators that is required for the identification of a real-time peak traffic situation.

12. Computer program product according to claim 11, characterized in that the program code has been further arranged to execute the step of:

selecting the aforesaid number of simultaneous peak elevators to be two.

13. Computer program product according to claim 10, characterized in that the program code has been further arranged to execute the steps of:

determining weighting values for the entrance floors on the basis of the statistical data and in accordance with the number of passengers; and

directing the elevators during an incoming peak traffic situation to the entrance floors according to the weighting values thus determined.

14. Computer program product according to claim 10, characterized in that the program code has been further arranged to execute the steps of:

defining the length of the time window to be used in the statistical data;

calculating the numbers of passengers arriving to and leaving the floor within the defined time window in relation to the time of the day;

adding the statistical data regarding the aforesaid numbers of passengers collected for the diurnal cycle under consideration to the existing statistical data, weighted by a predetermined updating coefficient; and

inferring from the said statistical data the most probable traffic type prevailing during each time window.

15. Computer program product according to claim 11 or 12, characterized in that the pro-

gram code has been further arranged to execute the steps of:

identifying a potential peak traffic situation if the said statistical data indicates a peak traffic situation; and

interpreting the potential peak traffic situation as an actual peak traffic situation if the number of peak elevators detected during the potential peak traffic situation is at least one but less than the aforesaid simultaneous number of peak elevators.

16. Computer program product according to claim 11 or 12, characterized in that the program code has been further arranged to execute the steps of:

calculating the said time interval between departures of elevators from the entrance floor;

forecasting on the basis of the statistical data the numbers of passengers gathering in the elevator queue during the aforesaid time interval;

identifying a potential peak traffic situation when the aforesaid forecast number of passengers exceeds the car load threshold value for peak hour identification; and

inferring the potential peak traffic situation as an actual peak traffic situation if the number of peak elevators detected during the potential peak traffic situation is at least one but less than the aforesaid simultaneous number of peak elevators.

17. Computer program product according to claim 15 or 16, characterized in that the program code has been further arranged to execute the step of:

requiring at least the said simultaneous number of peak elevators outside a potential peak traffic situation for identification of an actual potential peak traffic situation.

18. Computer program product according to claim 16, characterized in that the program code has been further arranged to execute steps wherein:

weighting coefficients are determined for one or more time windows preceding and following the time window used in the statistical data;

the number of passengers gathering is forecast in the aforesaid manner, in addition to the time window for the moment under consideration, for all the aforesaid time windows by using the weighting coefficients determined;

a potential peak traffic situation is identified if at least one of the said forecast numbers of passengers exceeds the car load threshold value for peak hour identification; and

the potential peak traffic situation is inferred as an actual peak traffic situation if at least one but fewer than the aforesaid simultaneous number of peak elevators are detected during the potential peak traffic situation.

19. System for identifying an incoming peak traffic situation in an elevator system, said system comprising:

at least one elevator (20, 23);

a car load weighing device (21, 24) for calculating the car load of elevator passengers for the identification of a peak elevator;

an elevator door light cell (22, 25) for counting the number of passengers entering the elevator and the number of passengers leaving the elevator;

a control logic (26) for recognizing car calls for identification of a peak elevator, for management of traffic flow and control of the elevator system;

characterized in that:

the system further comprises a database (27) for the collection of statistical data, said statistical

data comprising the numbers of passengers arriving to and leaving the floor during predetermined time windows; and that

the said control logic (26) has been arranged to interpret the prevailing traffic type as an incoming peak traffic condition if at least one peak elevator has been detected and the statistical data collected indicates an incoming peak traffic condition.

20. System according to claim 19, characterized in that the system further comprises:

second determining means (26) for determining the number of simultaneous peak elevators, which number is required for identification of a real-time peak traffic situation.

21. System according to claim 20, characterized in that the system further comprises:

a selector (26) for selecting the said number of simultaneous peak elevators to be two.

22. System according to claim 19, characterized in that the system further comprises:

first determining means (26) for determining weighting values for the entrance floors on the basis of the statistical data according to the number of users; and

control means (26) for directing the elevators to the entrance floors during an incoming peak traffic situation in accordance with the weighting values determined.

23. System according to claim 19, characterized in that the system further comprises:

third determining means (26) for determining the length of the time window used in the statistical data;

calculating means (26) for calculating the numbers of passengers arriving to and leaving the floor within a defined time window in relation to the time of the day;

summing means (26) for adding the said statistical data collected for the diurnal cycle under consideration and comprising the numbers of passengers to the existing statistical data (27), weighted with a predetermined update coefficient; and

first deducing means (26) for deducing the most probable traffic type prevailing during each time window on the basis of said statistical data.

24. System according to claim 20 or 21, characterized in that the system further comprises:

first identifying means (26) for identifying a potential peak traffic situation if the aforesaid statistical data indicates a peak traffic situation; and

second deducing means (26) for interpreting a potential peak traffic situation as an actual peak traffic condition if the number of peak elevators detected during the potential peak traffic situation is at least one but less than the aforesaid simultaneous number of peak elevators.

25. System according to claim 20 or 21, characterized in that the system further comprises:

time interval determining means (26) for calculating the average time interval between departures of elevators from the entrance floor;

estimating means (26) for forecasting the number of passengers gathering in an elevator queue on the basis of statistical data during the aforesaid time interval;

first identifying means (26) for identifying a potential peak traffic situation when the aforesaid forecast number of passengers exceeds the car load threshold value for peak hour identification; and

second deducing means (26) for inferring a potential peak traffic situation as an actual peak traffic situation if the number of peak elevators detected

during the potential peak traffic situation is at least one but less than the aforesaid simultaneous number of peak elevators.

26. System according to claim 24 or 25, characterized in that the said second deducing means (26) have been arranged to require at least the aforesaid number of peak elevators outside a potential peak traffic situation for identification of an actual peak traffic situation.

27. System according to claim 25, characterized in that the system further comprises:

fourth determining means (26) for determining weighting coefficients for one or more time windows preceding and following the time window used in the statistical data;

estimating means (26) for forecasting in the aforesaid manner the number of passengers accumulated in addition to the time window for the moment under consideration for all the aforesaid time windows by using the weighting coefficients determined;

second identifying means (26) for identifying a potential peak traffic situation if at least one of the aforesaid forecast numbers of passengers exceeds the car load threshold value for peak hour identification; and

second deducing means (26) for inferring a potential peak traffic situation as an actual peak traffic situation if the number of peak elevators detected during the potential peak traffic situation is at least one but less than the aforesaid simultaneous number of peak elevators.